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FEDERAL - STATE - PRIVATE

COOPERATIVE

SNOW SURVEY and WATER SUPPLY FORECASTS for MONTANA & NORTHERN WYOMING

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE, and MONTANA AGRICULTURAL EXPERIMENT STATION

USBA 103 LINCOLH HERE 1886

Data included in this report were obtained by the agencies named above in cooperation with the Bureau of Reclamation, U.S. Forest Service, U.S. Geological Survey, National Park Service, State Engineers of Montana and Wyoming and other Federal, State, and private organizations.

FEB. 1, 1961

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Cooperative Snow Survey and Water Supply Forecast Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

	1 ODEISHED BY OOIE	OOHOLHTAITON OLHTIOL	
REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
COLORAGO AND STATE OF UTAH	MONTHLY (JANMAY)	- SALT LAKE CITY, UTAH	UTAH STATE ENGINEER AND OTHER AGENCIES
COLUMBIA	MONTHLY (JANMAY)	BOISE, IOAHO	IOAHO STATE RECLAMATION ENGINEER
UPPER MISSOURI AND STATEOF MONTANA	MONTHLY (FEBMAY)	BOZEMAN MONTANA	MONT. AGR. EXP. STATION
WEST-WIDE	OCT. 1, APR. 1, MAY 1_	PORTLANO, OREGON	ALL COOPERATORS
STATES			
ALASKA	MONTHLY (MAR MAY)	PALMER, ALASKA	ALASKA S.C.D.
AR I ZONA	SEMI-MONTHLY (JAN.15 - APR.1)		SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO ANO NEW MEXICO	MONTHLY (FEBMAY)	FORT COLLINS, COLORAGO	COLO. AGR. EXP. STATION COLO. STATE ENGINEER N. MEX. STATE ENGINEER
I OAHO —	MONTHLY (FEBMAY)	BOISE, IOAHO	. IOAHO STATE RECLAMATION ENGINEER
NE VAO A	MONTHLY (FEBAPR.)	RENO, NEVADA	NEVAGA DEPT. OF CONSERVATION AND NATURAL RESOURCES DIVISION OF WATER RESOURCES
ORE GON	MONTHLY (JANMAY)	PORTLANO, OREGON	ORE. AGR. EXP. STATION OREGON STATE ENGINEER
WASHINGTON	MONTHLY (FEBMAY)	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING	MONTHLY (FEB. JUNE)	CASPER, WYOMING.	.WYOMING STATE ENGINEER
Copies of these various report	s may be secured from:	Head, Water Supply Forec Soil Conservation Servic 209 S. W. Fifth Ave., Po	e.
	PUBLISHED BY	Y OTHER AGENCIES	
REPORTS	ISSUED		AGENCY
BRITISH COLUMBIA	MONTHLY (FEBJUNE)		RIGHTS BR., DEPT. OF LANOS AND T BLOG., VICTORIA, B.C., CANAOA
CALIFORNIA	MONTHLY (FEB MAY)	CALIF. DEPT. OF WA	TER RESOURCES, SACRAMENTO, CALIF.

FEDERAL-STATE-PRIVATE COOPERATIVE

SNOW SURVEYS and WATER SUPPLY FORECASTS

For

MONTANA AND NORTHERN WYOMING

(Upper Missouri and Upper Columbia River Basins)

Report Prepared Ву

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and

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U. S. Department of Agriculture Soil Conservation Service Montana Agricultural Experiment Station Bozeman, Montana

Issued By

H. D. Hurd State Conservationist of Montana

O. W. Monson Irrigation Engineer Montana Agricultural Experiment Station

R. E. Huffman Director Montana Agricultural Experiment Station



MONTANA WATER SUPPLY OUTLOOK as of February 1, 1961

The present water supply outlook for Montana is poor. The February first snow-pack is considerably below average and generally less than last year by 20 to 50 percent.

If moisture conditions do not improve through the remainder of the snow season, the water supply in many areas will be very critical during the irrigation season. Farmers who depend upon natural streamflow for irrigation should give serious consideration to planting early maturing crops, such as small grains, that require less water than later maturing crops. Good water management and proper application will be necessary in most areas to obtain the most beneficial use of a limited water supply.

In the Missouri River Drainage, the Madison-Gallatin River basin snow-pack is 115 percent of last February, but only 66 percent average. In the Yellowstone River basin it is 110 percent of last February and 67 percent of the February average. The Beaverhead-Jefferson River basin is covered with a snow-pack which is 80 percent of last year and 49 percent average.

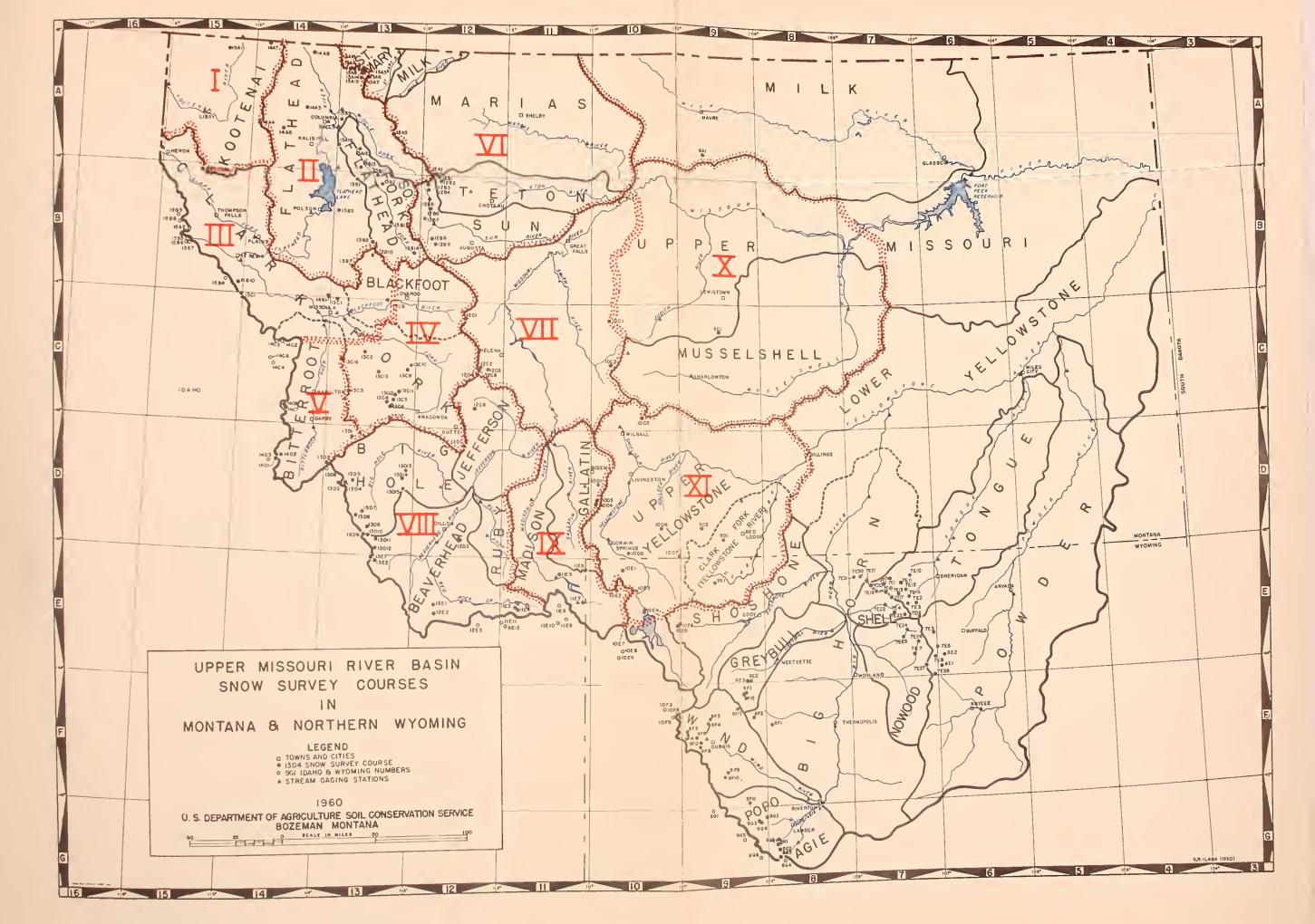
In the Columbia River Drainage in Montana, the outlook is not much better. Comparison with last year on the Kootenai River above Libby indicates a 9 percent better supply than last year, but 6 percent less than average. In the Flathead and Clark Fork River basins, the snow-pack is 20 percent less than last year and only 67 percent of average.

The deficient moisture condition in the soil underlying the snow-pack will have a great effect on this year's streamflow, producing less runoff than would normally be expected from an equivalent snow-pack.

Irrigation reservoir storage is generally below average throughout Montana.







INDEX TO MONTANA & NORTHERN WYOMING SNOW COURSES

Orainage Sasin and Course Name	Montana Number	Sler.	Locat Sec. Lat.	Np.		Record Began	Measuring Dates	Measured By	Drainage Basin and Course Hame	Montana Number	Elev.	Locati Sec. Lat.	Twp.	Range Long.	Record Began	Measuring Dates	Measured By	Drainage Basin and Course Name	Montana Humber	Elev.	Locati Soc. Lat.	Twp.	Range Long. (cont.)	Record Began	Measuring Dates	Measured By
PEVIS W2229735 4537428-45783	FRAD)	AL SO	CORE REV	Dr. Dr.A.	1802				(UPPER YELLOW			recreat po	ATIONAL	(2000)				(TONGUE RIVER	cont.)							
Lakeriew Ridge Lakeriew Janyon Limekiln white Pine Ridge (ROPOS PRAIRI	1183 1184 1282 1281	71/20 6930 6950 8850	27 26 5 18	148 148 158 148	2분 2분 9분 9일	1948 1948 1948 1948	3,4,5 3,4,5 3,4 3,4	10 10 1	Camp Senia Canyon Cooke City Crevice Mt. Independence Lake Camp Lupine Creek	9D1 10E3 10D7 10D5 10D6 10E4 10E1	7890 7750 7400 8400 8000 7850 7300	2 44.°-44.1 25 22 22 44.°-34.1 44.°-54.1	8S 9S 9S 7S	18E 110°-39 14E 9E 12E 110°-24 110°-37	1937 1935 1940 1936 1938	1,2,3,4,5 1,2,3,4,5 3,4 1,2,3,4,5 1,2,3,4,5	1 6 6 2 1 6	Horae Trail Div. Lake Oeneva North Tongue Sibley Lake Sucker Creek Steamboat Point Wood Rock O.S.	7E19 7E16 7E15 7E11 7E12 7E10 7E13	9200 9000 8800 8000 9000 7500 8500	29 7 17 10 19 32 3	55N 52H 55H 55H 56H 56H	90W 86W 89W 88W 87W 87W 88W	1956 1956 1956 1956 1956 1956	2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5	1 1 1 1 1 1 1 1 1
Bloody Dick Gold Stone Lembi Pass Terrell Greek	13010 1309 1351 13012 1352	7600 8100 7480 6650 7090	12 11 9 14 15	85 85 105 95 105	16W 16W 15W 15W 15W	1948 1948 1948 1948 1948	يار3 يار3 يار3 يار3 يار3	1 1 1 1	Lodgepole West Ecsebud (SHIELDS RIVER Porcupine	9E1 9D2	8200 7500	32 10	56H 78	106W 16E	1940 1960	2,3,4,5 1,2,3,4,5	1,4 4	(POWDER RIVER Crazy Woman Muddy Creek G.S.) Wyoming 6E2 6E1	8200 7800	6 2	17N 181	8hn 8hn	1956 1956	2,3,4,5 2,3,4,5	1
frail Greek Selway Junction (EIG ECLL)	13011	6800	27	8ప	15W	1948	3,4 3,4	1	LOWER YELLOWSTONE (WIND RIVER)		0,00	10	444	702	2/25	272		Munkers Pass North Powder #2 Onion Gulch Soldier Park Sour Dough	7E8 7E36 7E27 7E5 7E6	9700 8300 8100 8700 8500	11 20 31 36 17	48H 47H 46N 51N 49H	85W 85W 85W 85W 85W	1950 1956 1956 1950 1936	2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5	1 1 1 1
Big Hole Pass Big Hole Pass-Be. Bast Boundary	1303 1304 1305	7240 6900 8700	28 24 22	3S 3S 3S	18W	1948 1948	3,4 3,4	1	Big Warm Brooks Lake #3	9F12 10F8	8800 9200	36 23	և2N ևևN	109W 110W	1955 1939	2,3,4,5 2,3,4,5	1	Jour Dough	1100			VER BASI		1730	2,3,4,5	1
Gibbons Pass Jahnke Creek	1302 1308	7100 7340	ل 25	2S 7S	19W 16W	1934 1948	1,2,3,4,5	1,3	Burroughs Creek Dinwoodie	9F4 9F10	8800 10000	15	1,3N 39H	107W 105W	1948 1948	2,3,4,5	1	KOOTEHAI RIVER					-			
Miner Forks Miner Lake	1306 1307	7300 6720	10 5h	6S 6S	17W 16W	1948 1945	3,4 3,4,5	1	Dry Creek DuNoir	9F9 9F6	9500 8750	34 27	ЦN Ц2Н	6W 108W	1948 1940	2,3,4,5	1	Baree Creek	15811	5500	6	25H	30W	1956	4,5,5	2
(AISE RIVER) Anderson Miw. El < Horn	1301L 13015	7000 8450	18 15	35 145	12W 12W	1948 1935	3,4 3,4,5	1	East Fork Geyser Creek Little Warm Sheridan R.S. #1 Sheridan R.S. #2	9FL3 9F7 9F8 9F5 9FLL	9200 8500 9500 7500 7500	23 12 24 3	75N 75N 75N 77N	104W 108W 108W 109W	1956 1948 1948 1939 1955	2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5	1 1 1	Baree Mountain Red Mountain Weasel Divide FLATHEAD RIVER	1581 15A1 14A7	6000 6000 5450	1 4 8	25N 36N 37N	31W 29W 24W	1937 1937 1955	4,5,5 <u>}</u> 3,և,5,5 <u></u> և,5,5 <u></u>	
dise River	13013	6300	15	25	12W	1948	3,4	i	T-Cross Ranch Togwotee Pass	9F3 1099	8000 9600	1 29	LLIN	107W 110W	1940 1936	2,3,4,5	1 11	Basin Creek Big Creek	138îLA 1383	5000 6750	11 6&7	19H 22H	12W 18W	1951	2,3,4,5 3,4,5	2
(<u>EURY RIVER</u>) Flashlight	1293	6950	22	88	7ñ	1945	3,4,5	1	(POPO AGIE RIV	8G2	9500	23	31N	lolW	1939	2,3,4,5	1	Brush Creek Cattle Queen Desert Mountain Hell Roaring Div.	14А4 13А1 13А2М 14А3	5000 1700 5600 5770	13 7 24 35	30N 35N 31N 32H	26W 17W 19W 22W	1937 1939 1937 1942	3,4,5 3,4,5 1,2,3,4,5 3,4,5	1,2 6 1,2 1,2
MADISON RIVER									Bruce's Camp Hobb's Park Mosquito Park R.S.	8G5 9G3 9G4	6500 10000 9500	24 22 23	32N 2S 2S	101W 3W 3W	1955 1948 1940	2,3,4 2,3,4,5	1	Holbrook Kishenehn	13B13A 1LA6	1530 3886	18	21N 37N	13W 22W	1951 1954	1,2,3,4,5	6
Hebgen ≓est Yellowstone Norris Basin	11E5 11E7 10E2	6550 6700 7 500	22 34 14014 *	113 138	3E 53 1100-42:	1934 1934 1936	1,2,3,4,5 1,2,3,4,5 3,4	3 3 6	Sawmill Glade South Pass St. Lawrence	8G1 803 9F11	8500 9000 9000	3 13 26	31H 30N 1N	101M 101M	1939 1939 1940	2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5	1 1 1	Logan Creek Marias Pass Mineral Creek Quintonkon	14A5 13A5M 13A16 13A13	4300 5250 4000 3800	34 34 29 11	30N 30H 35N 26N	24W 14W 17W 17W	1937 1934 1957 1951	3,4,5 1,2,3,4,5 3,4,5 2,3,4,5	2 3 6 1,2
									Trout Creek (OWL CREEK) Wy	902 roming	8400	5	2S	2.M	1948	2,3,4,5	1	Spotted Bear Mt. Strawberry Lake	13B2M 13A10	7000 6500	23 11	25H 28H	15W 19W	1948 1948	3,4,5 3,4,5	1,2
GAMATIN RIVER Devil's Slide	1004	8100	14	£0	42	1025	0.3.1.5		Beavers Mill Owl Creek	9F2 8F1	8900 8 700	6 36	43н 43н	102W 101W	1948 1948	2,3,4,5 2,3,4,5	1	Trinkus Lake Trout Lake Twin Creeks Upper Holland Lk.	1381 13A12M 13B11 13B5	6500 3600 3580 7000	9 21 14 28	25H 28H 26H 20H	17₩ 17₩ 16₩ 16₩	1948 1948 1951 1948	3,4,5 3,4,5 2,3,4,5 3,4,5	2 1,2 1,2 2
hood Mesdow New World	1003	6600 6700	22 21:	58 48 38	62 62 62	1935 1935 1939	2,3,4,5 2,3,4,5 1,2,3,4,5	2,1 2,1	(GREYBULL RIVE	952 952	8800	25-	47N	103%	1948	2,3,4,5	1	CLARK PORK	1CD11	5500	4	251	304	3054	1. 5 52	2
NISSOURI RIVER MAI	1156	7150	1	115	52	1934	1,2,3,4,5	3	Timber Creek #2 Wood River #1 Wood River #2	9E3 9F1 9F15	8800 8000 8000	25 28 28	47N 46N 46N	103W 103W 103W	1955 1939 1956	2,3,4,5 2,3,4,5 2,3,4,5 2,3,4,5	1 1 1	Baree Creek Baree Mountain Black Pine Coyote Hill El Dorado Mine	15811 1581 13013 13810 1309	5500 6000 7100 4200 7800	1 25 12 23	25N 25N 8N 18N	304 31W 15W 16W	1956 1937 1960 1952	4,5,5½ 4,5,5½ 3,4,5 1,2,3,4,5	2 1 2
Chessean Reservoir		6200	2	819	54	1936	1,2,3,4,5	3	(SHOSHOWE RIVE	R) Wyomin;	3							Fred Burr Pass Freezeout Summit	13011 15B10	8000	12	6N 6N 15N	12W 13W 27W	1949 1957 1937	3,4,5 4,5	1 2
Orystal Lake Grassbopper Linzs Hill	901 1902 1001	6100 7000 7950	19 19 35	12N 9N 13N	18E 8E 7E	1941 1938 1934	3,4 3,4	1,2	East Entrance Sylvan Pass	10E6 10E5	7000 7100	17 12	52N 52N	109W 110W	1948 1936	1,2,3,4,5	6 6	Gold Creek Lk. Hoodoo Creek	13010 1501	7200 6200	1/1 9	8N 14H	12W 27W	1949 1937	ե և,5	1 2
Picnic Grounds Pipestone Pass	1206 12D1	6500 7200	10	59 1N	6ë 7W	1941	3,4,5 2,3,4 2,3,4,5	7	(NOWDOD CREEK)	Wyoming								Intergaard Lubrecht Forest #6 North Fork Jocko		11100 6120	6	77H 2N	13W 15W	1936 1951	2,3,4 1,2,3,4,5	12
Stemple Pass Tem Mile Greek L Tem Mile Greek M	1201	6900 6250	16 13	13N 8N	7W 6W	1934 1935	3,4,5 1,2,3,4,5	3	Cold Springs Camp Medicine Lodge Lks		8700 9500	1 7	50H 51N	88W 87W	1956 1956	2,3,4,5	1	Pipestone Pass Red Lion	13B7 12D1 13C12	6330 7200 7000	3 10 27	17H 1N 6N	17₩ 7₩ 13₩	1941 1938 1958	3,4,5 2,3,4,5 3,4,5	1
Ten Mile Greek U	1203 1204	6800 8000	13 19	8H 8H	6₩ 5₩	1934 1935	1,2,3,4,5	3	Munkers Pass Horth Powder	7E8 7E36	9700 8300	20	48N 47N	85W 85W	1950 1956	2,3,4,5	1	Slide Rock Mt. Southern Cross	1302 1305	7100 6500	35 8	100 5N	16W 13W	1º37 1936	2,3,4	1 4
(TETON RIVER)									Onion Gulch Tensleep Lake Tensleep R.S.	7E27 7E26 7E7	8100 9075 8300	31 33 30	48н 50н 49н	85W 86W 86W	1956 1956 1935	2,3,4,5 2,3,4,5 2,3,4,5	1 1	Stemple Pass Storm Lake Stuart Mill	1201	6900 7780	16 19	13N Lin	7W 13W	1934 1939	3,4,5 2,3,4	3
Freight Greek Waldron Greek West Fork	12A1 12B2 12B1	6000 5600	13 16	26N 25N	10W 9W	1948 1948	3,4 3,4	1	Tyrell R.S.	7E35	8300	30	49N	86W	1956	2,3,4,5	i	Stuart Mountain TV Mountain	1306 1301 1481	6500 7400 6800	19 6 33	77岁 2N	13W 18W 19W	1936 1936 1956	2,3,4 4 1,2,3,4,5	1,2
(SUN RIVER)	75 21	6000	6	2511	9₩	1948	3,4	1	(SHELL CREEK)		0600	2.2	CLU	0311	307/	0.71.7		Ambrose	13016	6475	28	9N	18W	1960	3,4,5	1
Benchmark Cabin Greek	1288	5500	9	208	10₩	1948	3,4	1	Bald Mountain Beaver-Tongue Div. Bone-Spring Div.	7E21 7E20 7E18	9600 9200 9200	33 12 32	56H 55N 55N	91W 91W 89W	1956 1956 1956	2,3,4,5 2,3,4,5 2,3,4,5	1 1	East Fork R.S. Gibbons Pass	13D1 13D2	5400 7100	16 4	2N 2S	17W 19W	1937 1934	1,2,3,4,5	i 3,1
5-Bill Gates Park	1236 1239 1235	5400 5600 5300	33 36	23H 20H	10W	1949 1948	3,4 3,4	1,2 1,2	Granite Creek Camp Granite Pass		7800 8950	15 19	53N 5կN	89W 88W	1956 1956	2,3,4,5	1	Iolo Pass Lost Horse	1405 1407	5230 5940	16	38N LLN	15E 23W	1956 1960	3,4,5,5 <u>}</u> 3,4,5	
Soat Mountain Wrong Ridge	1287	7000 6800	31 20 17	21N 22H 25N	10W 10W 10W	1949 1934 1949	3,4 3,4 3,4	1,2	Horse-Trail Div. Ranger Creek	7E19 7EL	9200 8800	29 32	55N 53N	90W 88W	1956 1935	2,3,4,5 2,3,4,5	1	Nez Perce Camp Nez Perce Pass Powell R.S.	17101 17101	5580 6575 4230	19&20 32 33	1S 28N 37N	23W 17E 14E	1937 1937 1956	3,4,5 1,2,3,4,4,5,5,1	
erong Greek	1284	5700	32	25H	10%	1949	3,4	1,2	Shell Creek (PORCUPINE CRE	7E23	9600	12	52N	88W	1956	2,3,4,5	1	Skalkaho Summit Twin Lakes	1303	7259 6510	30 32	6N 5N	17W 23W	1937 1960	3,4,5,5± 4 3,4,5	1
(MARIAS RIVER) Marias Pass		7070							Five Spgs. Falls	7E31	7500	19	56N	92W	1956	2,3,4,5	1	ST. MARY HIVER				RI VER BA		2700	23432	-
(MILE RITER)	1345%	5250	34	30H	TIW	193lı	1,2,3,4,5	3	Medicine Wheel	7E30	9000	24	56H	92W	1956	2,3,4,5	1	Iceberg Lake #3 Josephine Upper	13A3 13A15	5000	480-50	1	130-431	1922 1956	5 5	3,9
Booky Boy	941	5200	15	28N	162	1941	3,4	7	(TONGUE RIVER) Besver Tongue Div.		9200	12	55N	91W	2056	0.7.1		Josephine Lower #9 Mount Allen #7 Piegan #6	13A14 13A7 13A6	5700	480-461	1	13°-41'	1955	5	3,9
(MUSASTARRIL EI	1722)					-,	2,4	ŕ	Big Goose #2	7E2 7E32	7700 7700	4	53H 53N	86M 84M	1956 1935 1955	2,3,4,5 2,3,4,5 2,3,4,5	1	Ptarmigan #8	1348		780-201	1	13°-411	1922	5	3,0 3,9
Grasshopper	1002	7000	19	91	23	1938	3,4	2	Bone-Spring Div. Burgess R.S. #1	7£18 7E1	9200 7900	32 36	55H 56N	89W 89W	1956 1950	2,3,4,5 2,3,4,5 2,3,4,5	1	a. Numerals 1,2,3	LJ and E	refer to	lanua	Paka	a war 3 - U	nach 1		w 1
									Burgess R.S. #2 Dome Lake #1 Dome Lake #2	7£33 7£3 7£3L	7900 8600 8600	36 11 11	56n 53n 53h	89W 87W 87W	1955 1950	2,3,4,5	1	b. Humerals refer							•	y 1.
									Oloom Creek Granite Pass	7E11. 7E17	9300 89 5 0	32 19	55H 54N	87W 88W	1950 1956 1956	2,3,4,5 2,3,4,5 2,3,4,5	1	1. Soil Conservat	ion Servic			0	7. H	ontana Ex	periment Stat:	ion
1700m bills incolur acqui 1955																C 1 2 3 4 3 2	1	2. U. S. Porest S 3. U. S. Geologic 4. Montana Power	al Survey				8. C:	ity of Bo ominion W	zeman ater & Power	Bureau
																		5. U. S. Indian S 6. National Park	ervice		Soil Mo Aerial		11. U.	. S. Bure	and Wildlife au of Reclama ate Forestry	tion
																		-41		л -	3104 2 04		74.0 110	C. COMICO OF	E D 11 101	(10(0)



COMPARISON OF SNOW COVER WITH THAT OF PREVIOUS YEARS

Summary of Snow Survey Data by Tributary Watersheds February 1, 1961

TRIBUTARY WATERSHED	No. of Courses	No. Years	Expressed as	ater Equivalent S Percent of
	Averaged	Used	1960	1943-57 Average
Kootenai above Libby	8	7–15	109	94
Flathead	8	5-15	73	65
Clark Fork	13	5-15	87	68
Bitterroot	2	9-14	107	70
	MISSOURI RIVER	BASIN IN MO	<u>NTANA</u>	
Marias, Teton & Sun	1	15	82	68
Missouri Main Stem	4	15	54	49
Beaverhead-Jefferson	11	5-15	80	61
Madison-Gallatin	10	4-15	115	66
Upper Yellowstone	11	4-13	110	67



MONTANA SNOW SURVEYS ABOUT FEBRUARY 1, 1961

MISSOURI DRAINAGE

	Current Information Past Record												
			Date	Snow	Water		tent (In.)	Years					
No.	Snow Course Name	Elev.	of Survey		Content (In.)	Last Year	15-Year Average 1943-57	Record Used in Average					
BEAVER	HEAD-JEFFERSON BASI	<u>N</u>											
12E3 12C5 13D2 11E12 13D16 12C6 12D1 13C7 12C2 12C3 13C4	Camp Creek Chessman Res. Gibbons Pass Kilgore Moose Creek Picnic Grounds Pipestone Pass Storm Lake Tenmile, Lower Tenmile, Middle Tenmile, Upper	6800 6200 7100 6200 6200 6500 7200 7780 6250 6800 8000	1/30 1/27 1/30 1/29 1/30 2/1 1/30 1/27 1/29 1/28 1/29	16 4 41 18 31 11 26 15 18 20	3.4 0.8 11.4 3.9 7.6 1.7 2.8 7.0 2.9 4.1 4.7	4.5 3.0 9.8 5.1 8.0 1.7 4.2 6.6 5.1 8.2	7.0 3.4 16.4* 7.2 10.7 3.5* 3.2* 8.4* 5.1 7.4 9.4	15 15 14 15 9 13 14 5 15 15					
MADISO	N-GALLATIN BASIN												
11E9 10D4 11E5 10D3 11E10 10D1 10E2 11E6 11E8 11E7	Big Springs Devil's Slide Hebgen Hood Meadow Island Park New World Norris Basin Twenty-One Mile Valley View West Yellowstone	6500 8100 6550 6600 6315 6700 7500 7150 6500 6700	1/29 1/31 1/30 1/30 1/29 1/28 1/31 1/30 1/29 1/30	30 33 24 18 26 21 21 29 23 21	8.8 9.2 5.7 4.3 7.0 5.5 4.7 7.8 5.8 4.9	5.6 13.4 4.8 4.4 5.5 3.8 5.4 4.4 3.3	14.5 11.9* 8.6 4.5* 11.3 6.8* 7.7* 13.0 9.1* 8.8	15 4 15 4 15 10 8 15 11					
MISSOU	RI MAIN STEM												
1205 1202 1303 1204	Chessman Res. Tenmile, Lower Tenmile, Middle Tenmile, Upper	6200 6250 6800 8000	1/27 1/29 1/28 1/28	4 15 18 20	0.8 2.9 4.1 4.7	3.0 5.1 6.7 8.2	3.4 5.1 7.4 9.4	15 15 15 15					
MARIAS	, TETON & SUN BASIN												
13A5M	Marias Pass	5250	1/31	36	8.8	10.7	13.0	15					

^{**}Average for years of record shown in 1943-57 base period.



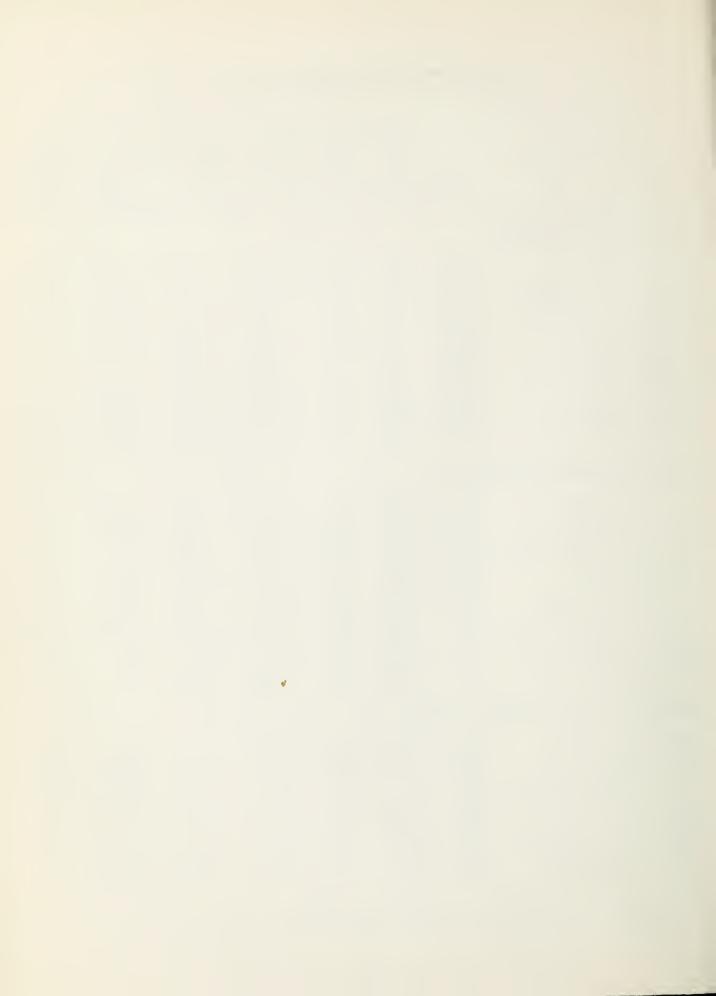
WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1961

					rmation	THE RESERVE OF THE PARTY OF THE	Record	
No.	Snow Course Name	Elev.	Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Con Last Year	tent (In.) 15-Year Average 1943-57	Years Record Used in Average
UPPER	YELLOWSTONE BASIN							
10E3 10D7 10D4 10E6 10D3 10E4 9E1 10E1 10D1 10E2 10E5 10E7	Canyon Cooke City Devil®s Slide East Entrance Hood Meadow Lake Camp #1 Lodgepole Lupine Creek New World Norris Basin Sylvan Pass Thumb Divide	7500 7400 8100 7000 6600 7850 8200 7200 6700 7500 7100 7900	1/31 2/1 1/31 2/4 1/30 1/31 1/30 1/31 1/28 1/31 2/4 1/30	31 23 33 29 18 21 22 21 21 21 32 32	6.2 4.0 9.2 5.4 4.3 3.7 3.7 5.5 4.7 8.4	3.9 2.8 13.4 3.5 4.4 2.9 3.3 2.8 5.5 3.8 4.1 7.0	9.4** 6.2** 11.9** 8.7** 4.5** 7.1** - 7.2** 6.8** 7.0** 10.2**	13 11 4 9 4 10 - 12 10 8 14 14
LOWER	YELLOWSTONE - WIND	RIVER	1					
9F12 9F4 9F10 9F17 9F9 9F6 9F7 9F8 9F14 9F3 #10F9 9G7	Big Warm Burrough Creek Dinwoodie Dinwoodie Glaciers Dry Creek DuNoir Geyser Creek Little Warm Sheridan R.S. #2 T-Cross Ranch Togwotee Pass Twenty Lakes	8800 8800 10000 10000 9500 8750 8500 9500 7500 8000 9600 10000	1/27 1/29 1/30 1/24 1/30 1/27 1/28 1/28 1/27 1/29 2/1 1/24	19 21 20 10 11 13 12 29 16 11 54	4.2 5.1 4.7 3.0E 2.5 2.7 2.2 7.2 2.7 2.4 15.3 2.0E	2.9 3.8 7.0 7.0E 2.5 2.2 2.0 7.9 2.0 2.3 14.4 3.0E	5.2** 11.0** 8.4** - 4.5** 6.1* 5.3** 11.8** 4.2** 5.5 20.6	5 11 11 15 11 10 5 15 15
LOWER	YELLOWSTONE - POPO	AGIE RI	VER					
8G2 8G5 9G3 9G4 8G1 # 8G3 9F11 9G2 9G7	Blue Ridge Bruce's Camp Hobbs Park Mosquito Park RS Sawmill Glade South Pass St. Lawrence R.S. Trout Creek Twenty Lakes	9500 6500 10000 9500 8500 9000 9000 8400 10000	1/23 1/24 2/1 2/1 1/24 1/23 1/31 2/1 1/24	15 10 27 11 16 21 10 12 8	4.1 1.6 8.0 2.4 3.3 4.2 2.6 2.1 2.0E	5.0 2.4 7.6 4.1 4.4 5.2 2.4 3.1 3.0E	8.5* 1.5** 12.0** 5.5* 5.5 10.3 4.6* 3.4**	14 5 11 14 15 15 14

^{**}Average of all past data. - #Adjacent drainage.

*Average for years of record shown in 1943-57 base period.

E Estimated water content.



WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1961

the state of the s				t Infor	mation	Past Record			
			Date	Snow	Water		tent (In.)	Years	
	Snow Course		of		Content	Last	15-Year	Record	
No.	Name	Elev.	Survey	(In.)	(In.)	Year	Average	Used in	
							1943-57	Average	
LOWER	YELLOWSTONE - GREYN	BULL RIV	ER.						
#9F19	Kirwin	10000	1/24	8	2.OE	5.0E	_		
8F1	Owl Creek	8700	2/2	20	4.3	2.9	3.7**	10	
		0,00	~/~	~~	400	~ 0 /		10	
LOWER	YELLOWSTONE - SHOSE	HONE RIV	<u>ÉR</u>						
#10E6	East Entrance	7000	2/4	29	5.4	3.5	8.7**	9	
9E5	Ishawooa Cone	9200	1/24	31	8.5	-	-	_	
#10E5	Sylvan Pass	7100	2/4	32	5.7	4.1	10.2**	14	
10F9	Togwotee Pass	9600	2/1	54	15.3	14.4	20.6	15	
9F18	Younts Peak	8500	1/24	20	4.0	-	-	-	
LOWER	YELLOWSTONE - OWL O	CREEK							
8Fl	Owl Creek	8700	2/2	20	4.3	2.9	3.7**	10	
LOWER	YELLOWSTONE - NOWOO	DD CREEK							
7E25	Cold Springs Camp	8700	2/3	16	3.5	6.5	_	_	
7E24	Medicine Lodge Lks		2/3 2/3	23	4.8	9.2	_	NAG.	
# 7E8	Munkres Pass	9700	2/1	18	3.5	8.8	_	_	
#7E27	Onion Gulch	8100	2/1 1/25	19	4.3	7.6	-	==	
7E26	W. Tensleep Lake	9075	1/25	18	4.0	9.1	_	····	
7E7	Tensleep R.S.	8300	2/1	19	4.2	7.5	-	-	
7E35	Tyrell R.S.	8300	2/1	20	4.1	7.7	-	-	
LOWER	YELLOWSTONE - SHELL	CREEK							
7E21	Bald Mountain	9600	1/25	39	11.4	17.3		_	
#7320	Beaver-Tongue Div		1/25	39	10.9	17.3	esc.	_	
#7E18	Bone-Spring Div.	9200	1/25	22	4.5E	13.4		_	
7E22	Granite Cr. Camp	7800	2/4	9	1.9	4.1		=	
#7E17	Granite Pass	8950	1/27	32	8.6	12.9	_	-	
7E4	Ranger Creek	8800	2/4	20	4.3	7.8		-	
7E23	Shell Creek	9600	1/25	27	6.0	11.3	-		

^{**}Average of all past data.
Adjacent drainage.
E Estimated water content.



WYOMING SNOW SURVEYS ABOUT FEBRUARY 1, 1961

			Curren	t Infor	mation	Past Record			
			Date	Snow	Water		tent (In.)	Years	
	Snow Course		of	Depth	Content	Last	15-Year	Record	
No.	Name	Elev.	Survey	(In.)	(In.)	Year	Average	Used in	
							1943-57	Average	
LOWER	YELLOWSTONE - PORCU	PINE CR	EEK						
7E31	Five-Springs Falls	7500	1/31	13	3.2	8.5	-	-	
7E30	Medicine Wheel	9000	1/25	31	8.4	16.3	_	-	
LOWER	YELLOWSTONE - TONGU	E RIVER							
7E20	Beaver-Tongue Div.	9200	1/25	39	10.9	17.3	-	-	
7E32	Big Goose #2	7700	1/30	15	2.9	5.9	-	-	
7E18	Bone-Spring Div.	9200	1/25	22	4.5E	13.4	-	-	
7E33 7E34	Burgess R.S. #2 Dome Lake #2	7900 8800	1/26	16 14	3.5 3.0E	7.0 7.5	_	_	
7E14		9300	1/25	22	4.5E	10.3			
#7E17	Granite Pass	8950	1/27	32	8.6	12.9	_	_	
7E15	North Tongue	8800	1/26	25	5.7	11.0	_	_	
7E11	Sibley Lake	8000	1/27	22	4.9	8.6	_	-	
7E10	Steamboat Point	7500	1/27	13	2.7	6.3	-	-	
7E12	Sucker Creek	9000	1/25	21	4.5E	10.2	-	-	
7E13	Wood Rock G.S.	8500	1/27	22	4.4	8.5	_	_	
LOWER	YELLOWSTONE - POWDE	R RIVER							
#7E28	Muddy Creek G.S.	7500	1/31	8	1.7	3.9	_	-	
# 7E8	Munkres Pass	9700	2/1	18	3.5	8.8	_	-	
#7E27	Onion Gulch	8100	2/1	19	4.3	7.6	-	-	
7E5	Soldier Park	8700	1/31	9	1.8	4.6	2.9**	7	
7E6	Sour Dough	8500	1/31	8	1.7	5.5			
						1			

^{**}Average of all past data.
Adjacent drainage.
E Estimated water content.



MONTANA SNOW SURVEYS ABOUT FEBRUARY 1, 1961

COLUMBIA DRAINAGE

				t Info	mation	Past	Record	
	•		Date	Snow	Water		tent (In.)	Years
	Snow Course		of	1	Content	Last	15-Year	Record
No.	Name	Elev.	Survey	(In.)	(In.)	Year	Average	Used in
							1943-57	Average
KOOTENAI	BASIN							
Can. 10	Fernie	3500	1/31	23	5.5	7.0	7.3	15
Can. 12A	Field	4200	1/31	22	7.6	7.2	4.5	15
Can. 43	Gray Creek	5100	1/28	40	12.8	12.3	12.5*	9
Can. 33 Can. 32	Kicking Horse Marble Canyon	5400 5000	1/31 1/27	35 37	10.3	9.4 6.3	10.9*	11
Can. 10A	New Fernie	4100	1/31	40	9.1	8.7	11.2*	7
Can. 8A	Sinclair Pass	4500	1/27	18	4.3	5.5	4.7*	10
Can. 20A	Sullivan Mine	5100	1/30	35	9.4	5.4	9.7*	12
FLATHEAD	BASIN							
13B14A	Basin Creek	5000	1/28	15	3.8	3.5	7.3*	7
13A2M	Desert Mountain	5600	1/27	25	6.8	12.4	11.2*	8
Can. 10	Fernie	3500	1/31	23	5.5	7.0	7.3	15
13B13A	Holbrook	4530	1/28	16	4.8	7.5	7.6*	7
13A5M Can. 1QA	Marias Pass New Fernie	5250 4100	1/31 1/31	36	8.8 9.1	10.7	13.0	15 7
13B2	Spotted Bear Mt.	7000	1/31	40 39	8.4	11.0	11.2	
13A12M	Trout Lake	3600	2/1	21	5.3	10.8	11.5*	5
14B1	TV Mountain	6800	1/27	26	6.1	8.9	_	-
13B11	Twin Creeks	3580	1/31	27	6.7	8.9	8.9*	7
CLARK FOR	K BASIN							
1205	Chessman Res.	6200	1/27	4	0.8	3.0	3.4	15
13B10	Coyote Hill	4200	1/31	28	5.0	6.6	7.9*	10
1502	Fish Lake Airstrip	5000	1/28	61	17.8	17.0	25.6*	6
1304	Intergaard	6450	2/1	18	3.9	5.2	5.1*	13
15B2 13C8	Lookout Lubrecht For. #6	5250 4040	1/31 2/1	75 10	19.8	16.8	25.6 3.4*	15 6
12D1	Pipestone Pass	7200	1/30	11	2.8	4.2	3.2*	14
1305	Southern Cross	6500	2/1	13	2.5	3.2	4.1*	13
1307	Storm Lake	7780	1/27	26	7.0	6.6	8.4*	5
1306 1301	Stuart Mill	6500	2/1	15	3.3	3.6	4.4	13
1202	Stuart Mountain Tenmile, Lower	7400 6250	1/29 1/29	46 15	13.6 2.9	- 5.1	5.1	15
1203	Tenmile, Middle	6800	1/28	18	4.1	6.7	7.4	15
12C4	Tenmile, Upper	8000	1/28	20	4.7	8.2	9.4	15
14B1	TV Mountain	6800	1/27	26	6.1	8.9	-	-
BITTERROO	T BASIN							
13D2	Gibbons Pass	7100	1/30	41	11.4	9.8	16.4*	14
13D16	Moose Creek	6200	1/30	31	7.6	8.0	10.7*	9

^{*}Average for years of record shown in 1943-57 base period.



AVAILABLE SOIL MOISTURE as of February 1, 1961

Drainage Basin and Station	Station No.	Elev.	Soil Profile in Inches Depth Cap.		Date		Moistu ches A 1960		2/1/61	Yrs
GALLATIN College Site	11D2M	4856	54	14.5	2/3	7.1	10.6	8.7	8.1	4
MADISON Red Bluff	11D4M	4800	40	3.6E	2/1	1.5	_	-	_	-
SHIELDS Battle Ridge Shields River	10D11M 10C4M	6020 5850	48 48	13.3	2/1 2/1	10.7	-	_	_	
FLATHEAD Desert Mountain Marias Pass Spotted Bear R.S. Trout Lake	13A2M 13A5M 13B15M 13A12M	6370 5250 3700 3600	54 54 28 54	6.8 8.4 5.9 11.8	1/27 1/24 2/1 2/1	6.1 5.1 4.3 12.6	8.4 6.4 5.2 12.3	7.9 6.3 4.9 12.4	7.2 5.8 4.7 12.1	4644

AVAILABLE SOIL MOISTURE as of October 1, 1960

						1960	1959	1958	Avg.	
GALLATIN College Site	11D2M	4856	54	14.5	9.30	5.8	8.6	6.8	5.8	4
MADISON Red Bluff	11D4M	4800	40	3.6E	New St	ation				
SHIELDS Battle Ridge Shields River	10D11M 10C4M	6020 5850	48 48	13.3 15.9	10/3 10/3	10.6	9903		-	-
FLATHEAD Desert Mountain Marias Pass Spotted Bear R.S. Trout Lake	13A2M 13A5M 13B15M 13A12M	6370 5250 3700 3600	54 54 28 54	6.8 8.4 5.9 11.8	9/23 9/26 9/23 9/23	4.5 3.2 0.6 6.9	7.2 5.6 4.3 9.8	5.9 4.5 3.7 10.5	5.5 4.7 3.1 7.9	4644



STATUS OF RESERVOIR STORAGE

February 1, 1961

BASIN		USABLE	USABLE	STORAGE -	1000 ACRE FE	ET .
& STREAM	RESERVOIR	CAPACITY 1000 A.F.	1961	1960	1943-57 Average	Years Record Used
COLUMBIA RIVER BASI	N - MONTANA				†	
Flint Creek S. Fk. Flathead Flathead River Flathead River 4/ Flathead River 5/ Clark Fork	Georgetown Lk. Hungry Horse Flathead Lake Camas Res. Mission Valley Noxon	31.0 3428.0 1791.0 45.2 100.3 200.1	25.0 3416.0 1008.0 22.5 28.1 177.1	28.6 3281.0 1324.0 34.2 50.8 192.4	24.0 2420.0** 991.3 23.6 31.6	15 5 15 15 15
MISSOURI RIVER BASI	N - MONTANA					
Beaverhead Madison River Madison River Hyalite Creek Missouri River Missouri River Missouri River Missouri River N. Fk. Sun River N. Fk. Sun River N. Fk. Sun River Birch Creek Dupuyer & Birch Judith River Missouri River Missouri River Missouri River Missouri River Missouri River Missouri River Milk River W. Rosebud Cr.	Lima Hebgen Lake Ennis Lake Middle Creek Canyon Ferry Hauser & Helena Lakes Lake Helena Holter Lake Gibson Willow Creek Pishkun Tiber Swift Lake Francis Ackley Lake Ft. Peck 3/ Fresno Nelson Mystic Lake	84.0 345.0 41.0 8.0 2043.0 61.9 10.4 81.9 105.0 32.3 32.0 1316.0 30.0 112.0 5.8 19410.0 127.2 66.8 20.8	9.9 125.8 39.3 - 1474.0 52.9 11.3 40.1 34.3 14.4 17.0 625.5 12.6 77.8 - 11410.0 27.5 41.8 11.8	24.7 36.2 39.2 3.9 1773.0 43.6 4.5 45.2 67.5 14.1 21.9 630.1 25.4 96.1 4.2 11020.0 82.5 50.2 9.7	32.7 223.3 35.7 3.3** 1412.0** 48.8 7.1** 62.1 59.7 18.7 18.9 - 20.9 94.5 4.2 11027.0 64.0 35.6 11.3	15 15 15 7 5 15 13 15 15 15 15 15 15 15 15 15 15

^{**} Average for years of record shown in 1943-57 base period.

^{3/} Gross contents; usable capacity less 617.0 A.F.; minimum power pool 4,500 A.F.

^{4/} Camas Reservoirs are shown as a sum of four (4) small reservoirs on the West side of Flathead Lake located on Dry Creek and Little Bitterroot River.

^{5/} Mission Valley Reservoirs are shown as a sum of eight (8) small reservoirs located south and east of Flathead Lake. Both Camas and Mission Valley Reservoirs are operated by the Indian Irrigation Service.



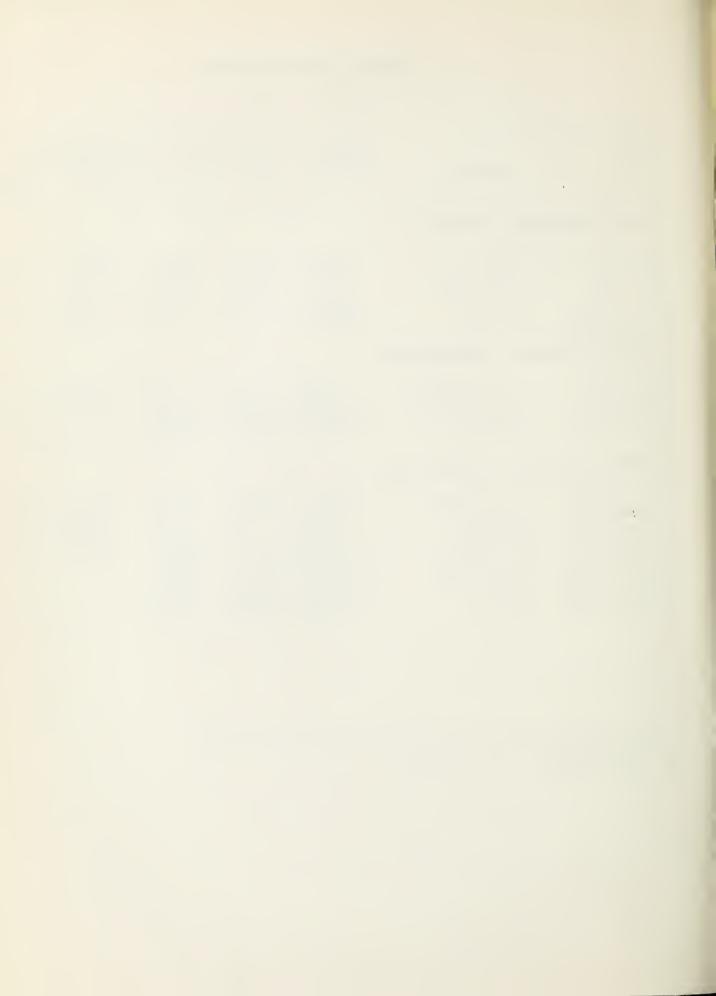
STATUS OF RESERVOIR STORAGE

February 1, 1961

DAGTN			T		000 1000 000	
BASIN		USABLE	USABLE S	rorage - 1	OOO ACRE FE	-
& STREAM	RESERVOIR	CAPACITY 1000 A.F.	1961	1960	1943-57 Average	Years Record Used
MISSOURI RIVER BA	ASIN - WYOMING					1
Shoshone River Wind River Wind River Bull Creek Belle Fourche	Buffalo Bill Boysen Pilot Butte Bull Lake Key Hole	440.0 560.0AC 31.6 152.0 190.0AC	127.0 88.7 10.4 57.7 3.3	141.4 159.8 10.5 39.5 0.1	244.6 276.4** 11.2 70.7 10.2**	15 5 15 15 5
MISSOURI RIVER BA	ASIN - NORTH DAKOTA			1	1	1
Heart River Heart River Missouri River James River	Lake Tschida E. A. Patterson Garrison Lake Jamestown	68.7AC 5.6AC 18100.0AC 220.0AC	48.9 3.5 5408.1 15.8	44.3 3.8 3820.5 8.2	51.8** 3.7** -	7 6 -
MISSOURI RIVER BA	ASIN - SOUTH DAKOTA		•	ŀ		1
Belle Fourche Cheyenne River Cheyenne River Grand River Missouri River Missouri River Missouri River Cheyenne River	Belle Fourche Angostura Deerfield Shadehill Ft. Randall Gavins Point Oahe Pactola	185.2AC 90.0AC 15.1AC 84.0AC 3800.0AC 320.0AC 17000.0AC 55.0AC	22.5 2.3 2.3 51.2 2390.0 242.0 1043.0T 15.9	27.6 17.5 1.0 69.7 2471.5 326.7 345.0T 23.8	92.0 43.2** 12.6** 76.0**	15 6 10 5 -

^{**} Average for years of record shown in 1943-57 base period. AC Active Capacity - USBR Billings.

T Total Storage.



Agencies Cooperating in Collecting Data Contained in this Bulletin

- U. S. Forest Service Region I, Missoula, Montana
- U. S. Geological Survey Helena, Montana
- U. S. Army Corps of Engineers Portland, Oregon Seattle, Washington Omaha, Nebraska Riverdale, N. D.
- U. S. Indian Irrigation Service St. Ignatius, Montana
- U. S. Weather Bureau Helena, Montana
- U. S. Fish & Wildlife Service Red Rock Lakes Refuge Monida, Montana
- U. S. Bureau of Reclamation Billings, Montana Boise, Idaho
- Montana Power Company Butte, Montana
- Agricultural Experiment Station North Montana Branch Station Havre, Montana
- Montana State Highway Dept. East Glacier, Montana

- National Park Service Yellowstone National Park Glacier National Park
- Montana Experiment Station Montana State College Bozeman, Montana
- Bonneville Power Administration Portland, Oregon
- Montana State School of Forestry Montana State University Missoula, Montana
- Soil Conservation Service Montana, Wyoming, Idaho
- Soil Conservation Districts
 Montana Counties
- Johnson Flying Service, Inc. Missoula, Montana
- Water Rights Branch
 Dept. of Lands & Forests
 Victoria, British Columbia
- Department of Northern Affairs & National Resources Calgary, Alberta

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SOIL CONSERVATION SERVICE
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COOPERATIVE SNOW SURVEYS

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"The Conservation of Water begins with the Snow Survey"